

Name: _____

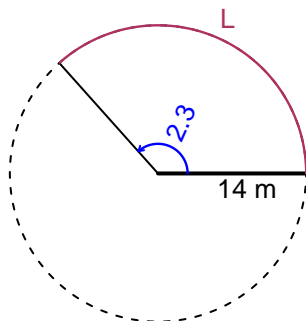
Date: _____

Trig Final (SLTN v674)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 2.3 radians. The radius is 14 meters. How long is the arc in meters?

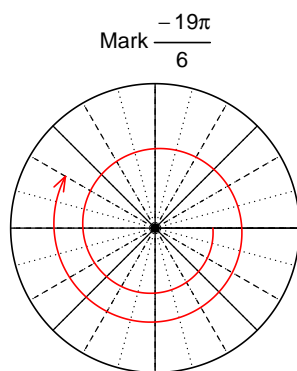


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$L = 32.2$ meters.

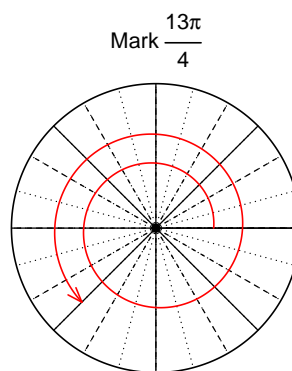
Question 2

Consider angles $-\frac{19\pi}{6}$ and $\frac{13\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(-\frac{19\pi}{6}\right)$ and $\sin\left(\frac{13\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\cos(-19\pi/6)$

$$\cos(-19\pi/6) = \frac{-\sqrt{3}}{2}$$



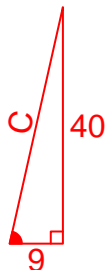
Find $\sin(13\pi/4)$

$$\sin(13\pi/4) = \frac{-\sqrt{2}}{2}$$

Question 3

If $\tan(\theta) = \frac{-40}{9}$, and θ is in quadrant II, determine an exact value for $\sin(\theta)$.

Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



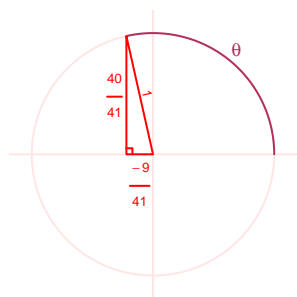
Solve the Pythagorean Equation

$$9^2 + 40^2 = C^2$$

$$C = \sqrt{9^2 + 40^2}$$

$$C = 41$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\sin(\theta) = \frac{40}{41}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 2.19 Hz, a midline at $y = -4.66$ meters, and an amplitude of 8.88 meters. At $t = 0$, the mass is at the midline and moving down. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -8.88 \sin(2\pi 2.19t) - 4.66$$

or

$$y = -8.88 \sin(4.38\pi t) - 4.66$$

or

$$y = -8.88 \sin(13.76t) - 4.66$$